

Attorney's Docket No.: 10559-867001'P17315
Intel Corporation

Listing of Claims

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Currently Amended) A photoresist comprising:

a polymer backbone;

a lactone bonded to ~~a~~ the polymer backbone, the lactone being reactable under semiconductor processing conditions and in the presence of an acid to undergo a ring-opening reaction and form an open ring structure to switch a solubility of the photoresist in a developer without generating an organic species that can outgas in a vacuum environment; and

a side chain bonded to the polymer backbone, the side chain comprising a styrene ring.

2. (Original) The photoresist of Claim 1, wherein the lactone comprises a five-sided ring of carbon and oxygen.

3. (Original) The photoresist of Claim 1, wherein the lactone comprises a six-sided ring of carbon and oxygen.

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4. (Previously Presented) The photoresist of Claim 1, further comprising a first group attached to the carbon bonded to the lactone carbonyl oxygen.

5. (Original) The photoresist of Claim 4, wherein the first group comprises an electron-withdrawing group.

6. (Original) The photoresist of Claim 4, wherein the first group comprises an alkyl group.

7. (Original) The photoresist of Claim 4, wherein the first group comprises a cage group.

8. (Original) The photoresist of Claim 4, wherein the first group comprises a phenyl group.

9. (Original) The photoresist of Claim 4, wherein the first group comprises carbon, oxygen and hydrogen.

10. (Original) The photoresist of Claim 4, wherein the first group comprises nitrogen dioxide.

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11. (Original) The photoresist of Claim 4, wherein the first group comprises hydroxide.

12. (Previously Presented) The photoresist of Claim 4, wherein the first group comprises $-CF_3$.

13. (Previously Presented) The photoresist of Claim 4, further comprising a second group attached to the carbon bonded to the lactone carbonyl oxygen, the first and second groups comprising the same molecules.

14. (Previously Presented) The photoresist of Claim 4, further comprising a second group attached to the carbon bonded to the lactone carbonyl oxygen, the first and second groups comprising different molecules.

15. (Previously Presented) The photoresist of Claim 1, further comprising a photoacid generator molecule to form the acid upon radiation exposure.

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16. (Previously Presented) The photoresist of Claim 1, wherein the lactone is reactable in the presence of the acid to change a solubility of the photoresist in a basic aqueous developer.

17. (Previously Presented) The photoresist of Claim 1, wherein the lactone is reactable in the presence of the acid to form an open ring structure bound to the polymer backbone with no outgassing molecules in a vacuum environment.

18. (Original) The photoresist of Claim 17, wherein the open ring structure increases solubility of the photoresist in an aqueous base developer.

19. (Original) The photoresist of Claim 1, further comprising a side chain styrene group bonded to the polymer backbone.

20. (Original) The photoresist of Claim 19, wherein the side chain styrene group is attached to a group comprising at least one of hydroxide (OH), an alkyl group and a cage group.

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21. (Previously Presented) A method comprising:
forming a photoresist ~~with~~ having a polymer backbone and a
lactone[[,]] bonded to the polymer backbone; and
switching the solubility of the photoresist in a developer
by exposing the lactone being bonded to the polymer backbone
under vacuum, thereby causing the lactone to undergo a ring
opening reaction upon exposure to an acid catalyst without
molecules outgassing from the photoresist,
wherein the lactone including includes a tertiary carbon
bonded to the lactone carbonyl oxygen.

22. (Original) The method of Claim 21, wherein forming
the photoresist comprises forming a chemically amplified
photoresist.

23. (Previously Presented) The method of Claim 21, wherein
forming the photoresist comprises forming the photoresist with a
first group attached to the carbon bonded to the lactone
carbonyl oxygen, the first group comprising one or more of an
alkyl group, a cage group, and a phenyl group.

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24. (Previously Presented) The method of Claim 21, wherein forming the photoresist comprises forming the photoresist with first and second groups attached to the carbon bonded to the lactone carbonyl oxygen, the first and second groups being identical.

25. (Previously Presented) A method comprising:

radiating an area of a chemically amplified photoresist in a vacuum environment; ~~and to generating~~ generate an acid within the photoresist; ~~to and~~

catalyze catalyzing a ring-opening reaction in the photoresist, the ring-opening reaction sufficing to switch the solubility of the photoresist in a developer without the generation of molecules outgassing that outgas from the photoresist in the vacuum environment.

26. (Previously Presented) The method of Claim 25, wherein said radiating comprises radiating with extreme ultraviolet (EUV) radiation.

27. (Previously Presented) The method of Claim 25, wherein said radiating comprises radiating the area of the photoresist comprising a hydroxystyrene copolymer.

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28. (Previously Presented) The method of Claim 25, wherein generating the acid within the photoresist comprises catalyzing the ring-opening reaction of a lactone in the photoresist.

29. (Previously Presented) The method of Claim 28, wherein catalyzing the ring-opening reaction comprises catalyzing the ring-opening reaction of a lactone that includes a tertiary carbon bonded to the lactone carbonyl oxygen.

30. (Previously Presented) The photoresist of Claim 1, wherein the lactone comprises a tertiary carbon bonded to the lactone carbonyl oxygen.

31. (Previously Presented) The method of claim 21, wherein forming the photoresist comprises forming the polymer backbone using a hydroxystyrene copolymer.

32. (Previously Presented) The method of claim 21, wherein forming the photoresist comprises forming the lactone to undergo the ring opening reaction upon exposure to the acid catalyst and under semiconductor processing conditions.

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33. (Previously Presented) A photoresist comprising:

a polymer backbone;

a lactone fused to a the polymer backbone, the lactone comprising a tertiary carbon bonded to the lactone carbonyl oxygen; and

a styrene ring side chain bonded to the polymer backbone,

wherein sufficient lactone is fused to the polymer backbone so that a ring-opening reaction of the lactone to form an open ring structure suffices to switch a solubility of the photoresist in a developer.

34. (New) A photoresist comprising:

a lactone bonded to a polymer backbone, the lactone being reactable under semiconductor processing conditions and in the presence of an acid to undergo a ring-opening reaction and form an open ring structure without generating an organic species that can outgas in a vacuum environment, the lactone having a first group comprising nitrogen dioxide attached to the carbon bonded to the lactone carbonyl oxygen.